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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/779,287	02/08/2001	George Ernest Morris	37,248-04	6598

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EXAMINER	
GRIFFIN, WALTER DEAN	

ART UNIT	PAPER NUMBER
1764	

DATE MAILED: 06/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/779,287	MORRIS ET AL.	
	Examiner	Art Unit	
	Walter D. Griffin	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19 and 22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19 and 22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 17, 2004 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatanaka et al. (US 6,217,748) in view of EP 0482841 A1 and Ford et al. (US 3,341,448).

The Hatanaka reference discloses a process in which a sulfur-containing gas oil is hydrotreated to remove sulfur compounds. This gas oil would necessarily have an API gravity within the claimed range. This hydrotreating is conducted in the presence of a hydrotreating catalyst. The resulting hydrotreated feed is separated into a light fraction and a heavy fraction. The cut point temperature for separation of the fractions is in the range of 300 to 350°C. The light fraction is essentially free of sulfur whereas the heavy fraction must be further desulfurized to remove, for example, dibenzothiophene compounds. Following this further desulfurization, the light and heavy fraction are blended to produce a fuel. See col. 2, lines 65-67; col. 3, lines 1-11 and 26-56; col. 4, lines 11-67; col. 5, lines 1-23 and 65-67; and col. 6, lines 1-10.

The Hatanaka reference does not disclose desulfurization of the heavy fraction by contacting it with a quaternary ammonium salt, hydrogen peroxide, and acid.

The EP 0482841 A1 reference discloses a process for desulfurizing a hydrocarbon oil such as a diesel by combining the oil with an aqueous solution of an oxidant such as hydrogen peroxide and catalyst and oxidizing the sulfur in the oil. The catalyst can be a phosphotungstic acid. A phase transfer agent such as a quaternary ammonium salt can be included in the solution. The oxidized sulfur is then separated from the oil. The separation can be performed by contacting the oil with a solvent (e.g., C_1-C_4 alcohols) to extract the oxidized sulfur or by

contacting the oil with an adsorbent such as silica. See page 2, line 26 through page 3, line 13 and the examples.

The Ford reference discloses that the degree of desulfurization achieved by successive oxidative and hydrodesulfurization stages is significantly higher than that achieved by either two successive oxidative desulfurization stages or two successive hydrodesulfurization stages and that the improvement is independent of the order of the stages. See col. 3, lines 13-30.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Hatanaka by substituting the desulfurization process of EP 0482841 A1 for the second desulfurization of Hatanaka because the desulfurization of EP 0482841 A1 is effective for removing sulfur compounds removed by the second desulfurization of Hatanaka. Additionally, as disclosed by Ford, combining the first hydrodesulfurization of Hatanaka with the oxidative desulfurization of EP 0482841 A1 would result in the expectation that a significantly higher degree of desulfurization would be achieved than is achieved by the two successive hydrodesulfurization stages disclosed by Hatanaka.

Regarding the claimed quaternary ammonium salt, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the references by utilizing the claimed quaternary ammonium salts because these salts are chemically similar to the disclosed salts and therefore would be expected to be effective in the claimed process.

Regarding the recycle of the aqueous phase, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the references by

recycling the aqueous phase because material costs will be reduced by recycling thereby improving the economics of the process.

Regarding the presence of nitrogen in the feed, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the references by utilizing a feed that also contains nitrogen compounds because one would expect the sulfur compounds to be effectively oxidized regardless of the presence of nitrogen.

Additionally, combining the disclosed separation methods of solvent extraction and adsorption would have been obvious to one having ordinary skill in the art because combining two known separation methods would result in the expectation of the recovery of a purer product.

Response to Arguments

The argument that the combination of steps for purification of petroleum streams generally does not produce a purer product than fewer steps is not persuasive because the Ford reference would suggest that to one having ordinary skill in the art that substituting an oxidative desulfurization stage for the second hydrotreating stage of Hatanaka would achieve a significantly higher degree of desulfurization. Therefore, the examiner asserts that one of ordinary skill would expect the process of Hatanaka as modified by the EP reference to produce a purer product.

The argument regarding the use of water in the liquid-liquid extraction step is not persuasive because this limitation is not claimed. Nowhere in the claims is the solvent limited to water.

The Affidavit of William Gong has been considered but is not persuasive. The argument that the claimed invention produces unexpected improvements over the teachings of Hatanaka is not persuasive for the reasons discussed above. The argument that the EP reference to Collins et al. does not suggest the advantages of ODS over HDS is not persuasive because such advantages are suggested by the Ford reference. The fact that Ford teaches that the improvement results regardless of the order of the HDS and ODS steps does not negate the fact that an improvement in the degree of desulfurization would be expected by substituting the ODS step of Collins for the second HDS step of Hatanaka. The argument regarding the feed type of Ford is not persuasive because Ford teaches that the petroleum fractions to be treated can be those of high molecular weight. See, for example, column 1, lines 13-16. The examiner asserts that this teaching would suggest to one having ordinary skill in the art that the claimed fraction would be effectively treated by ODS and one would obtain the improved degree of desulfurization. The argument that the claimed quaternary ammonium salts are distinguished from those disclosed by Collins in the EP reference is not persuasive because the specific salts disclosed on page 2, lines 54-57, appear to have the same structure as that represented by the claimed formula. The fact that nitrogen compounds are oxidized as well as sulfur compounds does not negate the fact that one would expect a sulfur and nitrogen-containing feed to be effectively oxidized to reduce the sulfur content of the feed. The argument concerning the use of water as a solvent is not persuasive because water is not claimed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter D. Griffin whose telephone number is (571) 272-1447. The examiner can normally be reached on Monday-Friday 6:30 to 4:00 with alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Walter D. Griffin
Primary Examiner
Art Unit 1764

WG
June 4, 2004